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Application Number (21) 52771/73 Lodged (22) 1st March, 1973

Complete Specification entitled (54) CONCRETE SILENT FORMS

MX

52,771/73

Casting concrete walls and form therefor

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Int. Cl. E04B 2/86; E04G 11/06.

486,232. (52,771/73) 1 Mar. 1973. Complete Specification lodged, 1 Mar. 1973. **Speed-Form Manufacturing (Australia) Ltd.** Address for service in Australia—Clement Hack & Co., 414 Collins Street, Melbourne, Vic. 3000. (2)

Claim 8. A precast concrete form useful for pouring concrete therein having inner and outer precast concrete walls and a pour space therebetween on a footing having vertical extensions, the inner and outer precast concrete walls being comprised of a plurality of courses of precast concrete units arranged in edge to edge abutting relationship, each said precast concrete unit having at least two spaced vertical apertures in both the top and bottom edges of the precast concrete unit, the apertures being adapted to receive vertical reinforcing elements, a plurality of individual horizontal grooves corresponding in number to the number of apertures and extending inwardly from the mouths of the apertures in at least one of the top or bottom surfaces of the precast concrete units to the inner faces of the precast concrete units, the lowermost row of concrete units being laid in end to end relationship with the apertures in the bottom surface of the concrete units resting on the vertical extensions set in the concrete footing, H-shaped form ties having vertical extensions adapted to engage in said vertical apertures to thereby secure the precast concrete units in rigid vertical relationship, the horizontal bars of said H-shaped ties being received in respective twos of said grooves to thereby secure the inner and outer precast concrete walls relative to one another. [11]

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Applicant (71) SPEED-FORM MANUFACTURING (AUSTRALIA) LTD.

Actual Inventor (72) JOHN RUDICHUK

Related Art (56)

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10356/32		81.1, 81.2
248658	(60925/60)	81.1, 81.2, 78.9
16607/24		81.1, 81.2
206997	(10111/55)	81.11

The following statement is a full description of this invention, including the best method of performing it known to us :

F. D. Atkinson, Government Printer, Canberra

This invention relates to a form for pouring concrete and a method of erecting such a concrete form.

It is common in all concrete forming for a temporary form to be constructed from lumber or other materials into which the concrete is poured and allowed to set. After the required time for setting, the forms are removed (stripping), the concrete surface cleaned and patched to give a smooth surface, and the forming material hauled away, perhaps to be discarded or used on another job site if the lumber can be adapted. Because of the stress of the concrete during this process considerable lumber and detailed construction of the form is required to provide the necessary strength to the form. Considerable time is required by carpenters to perform the construction of the forms which serve this temporary purpose. The result of this procedure often gives an uneven surface showing the imprint of the form itself. The concrete often is not forced down into the form sufficiently thus resulting in depressions or gaps in the concrete which must be subsequently repaired by a patching technique. A decorative finish to a concrete surface is not possible without considerable further work and procedure.

In one aspect the present invention provides a filled block and tie wall building system comprising:

a footing;

an inner wall of generally thin cross section rectangular flat-ended, flat-edged vertically disposed precast concrete unit modules abutted flat end to flat end in a course and each course arranged in a plurality of superimposed courses in which lower edges of modules in upper courses abut upper edges of respective lower

courses;

the inner and outer walls being transversely spaced in a parallel manner, with corresponding courses of each wall being at equivalent heights;

the lower edges of the lowermost courses of the modules being supported upon said footing;

means securing said lowermost courses to the footing to prevent lateral movement of the inner and outer walls with respect to the footing;

means defining at least two longitudinally spaced, upwardly opening apertures in the upper edge of each module;

means defining at least two longitudinally spaced, downwardly opening apertures in the lower edge of each module;

means defining two grooves in at least one of the upper and lower edges of each module, interconnecting the respective two apertures with the inner face of the respective module; and

a plurality of H-shaped ties, each including: two, transversely spaced, vertically upwardly projecting legs; two, transversely spaced, vertically downwardly projecting legs; and a transversely extending cross bar;

the ties being assembled with the modules as follows: each tie having the two downwardly projecting legs thereof received in respective two of the upwardly opening apertures in the upper edges of two transversely spaced ones of said modules at equivalent heights; each respective tie having the two upwardly projecting legs thereof received in a respective two of the downwardly opening apertures in the lower edges of two transversely spaced ones of said modules

in thenext upper course at equivalent heights; and the transversely extending cross bar being received in a respective two of said grooves in a respective transversely spaced two of said modules; the inner and outer walls being characterized by the absence of mortar between the abutting ends and edges of adjacent modules in the same inner wall and between the abutting ends and edges of adjacent modules in the same outer wall.

In another aspect the present invention provides a method of constructing a permanent concrete form of two opposed sides defining a concrete pour space therebetween wherein the two opposed sides are comprised of a plurality of side members arranged in stacked courses in end to end abutting relationship, said side members each having vertically extending apertures located in both the top and bottom edges thereof, adapted to receive the vertically extending legs of H-shaped form ties, and horizontal grooves extending from the mouths of the apertures to the inner face of the top and bottom edges of the side members adapted to receive the horizontal bars of the H-shaped form ties, including the steps of laying a first course of side members in end to end abutting relationship with the apertures in the bottom edges of the side members resting on upwardly protruding anchors in a footing, inserting the lower legs of the H-shaped form ties one in each of the respective apertures in the tops of opposing pairs of side members located in the course opposite one another in the two opposed sides, and placing a further course of side members in end to end abutting relationship on the two opposed sides of the first course of members so that the bottom apertures of the upper pairs of side members are received on the

respective upstanding legs of the H-shaped form ties protruding vertically from the tops of the first course of side member pairs below, and continuing similarly with subsequent stacked courses of pairs of side member and H-shaped ties until a desired height for the two opposed sides is reached.

In another aspect the present invention still further provides a precast concrete form useful for pouring concrete therein having inner and outer precast concrete walls and a pour space therebetween on a footing having vertical extensions, the inner and outer precast concrete walls being comprised of a plurality of courses of precast concrete units arranged in edge to edge abutting relationship, each said precast concrete unit having at least two spaced vertical apertures in both the top and bottom edges of the precast concrete unit, the apertures being adapted to receive vertical reinforcing elements, a plurality of individual horizontal grooves corresponding in number to the number of apertures and extending inwardly from the mouths of the apertures in at least one of the top or bottom surfaces of the precast concrete units to the inner faces of the precast concrete units, the lowermost row of concrete units being laid in end to end relationship with the apertures in the bottom surface of the concrete units resting on the vertical extensions set in the concrete footing, H-shaped form ties having vertical extensions adapted to engage in said vertical apertures to thereby secure the precast concrete units in rigid vertical relationship, the horizontal bars of said H-shaped ties being received in respective twos of said grooves to thereby secure the inner and outer precast concrete walls relative to one another.

In another aspect the present invention still

further provides a form for pouring concrete wherein inner and outer precast concrete walls define a pour space therebetween on a footing having vertical extensions and are permanent constituents of the structure to be formed, the inner and outer precast concrete walls being formed of concrete units which are arranged in edge to edge and end to end abutting relationship, each precast concrete unit having at least two spaced vertical apertures in both the top and bottom surfaces of the unit and a corresponding plurality of individual horizontal grooves in at least one of the top or bottom surfaces of the precast concrete units, extending inwardly from the exterior of a respective vertical aperture to the inner face of the precast concrete units, the lowermost row of concrete units being laid in end to end relationship with the apertures in the bottom surface of the concrete units resting on the vertical extensions set in the concrete footing, H-shaped form ties the lower legs of which are insertable into the vertical apertures of the precast concrete units with the connecting cross bar of the H-shaped form tie being received in respective twos of said grooves in the top or bottom surfaces of the units to thereby space the opposing precast concrete units apart, the upper legs of said H-shaped form ties being insertable into the vertical apertures in the bottom of the precast concrete units to be added as a course in the next row.

Thus an outer form is utilized into which concrete is poured, the form itself remaining as part of the structure and the only outward visible surface of the structure. The forms are secured together by a system of ties which give additional strength to the structure much the same as the

The advantages of the permanent form include:

(a) Lower construction costs since the construction

steel reinforcing rods utilized in ordinary concrete forming construction. The form can be made in any size and can provide a decorative block appearance or a flat uniform surface. There is no danger of removing forms prior to the concrete reaching its maximum strength since the form itself is part of the structure.

The advantages of the permanent form include:

(a) Lower construction costs since the construction of wooden forms is not necessary, nor the accompanying removal of same. No hauling or disposing of wooden forms is necessary.

(b) The permanent form has a built-in system of reinforcing steel rods which give additional strength and secure the entire structure.

(c) The permanent form results in a surface which can provide a decorative finish.

(d) No additional brace supports or brackets are required during the pouring stage except the one brace which runs from the form second from the top of the wall or column, down to a secure surface. One "two by four" holds the bracket in position and the entire brace bracket is easily removed after the required period for the concrete to set.

(e) The permanent form can be made in various sizes by varying form construction. Similarly the ties can be made of any size to suit the forms and the nature of the construction.

(f) The unitary construction of the H-shaped retaining members ensures that there is no free-play between the horizontal tie portion and the vertical pin

portion of the retaining member and so enables the building of a wall having many courses of concrete units ready for the pouring of concrete thereinto. This wall structure is quite stable since the unitary retaining member does not permit relative twisting movement between the courses.

In the drawings which illustrate embodiments of the invention:

Figure 1 is a top perspective view of a section of the form for pouring concrete built up of precast concrete units according to one form of the invention.

Figure 2 is a perspective view of the outwardly facing side of one of the precast concrete units.

Figure 3 is a top plan view of a precast concrete unit.

Figure 4 is a side elevation view of a precast concrete unit.

Figure 5 is a top view of a precast concrete corner unit.

Figure 6 is a top view of a channel-shaped precast concrete unit.

Figure 7 is a plan view of the H-shaped retaining member used to maintain opposite, overlying and underlying precast concrete structural units in place.

Figure 8 is a plan view of the U-shaped retaining member inserted in the concrete footing to maintain the first row of precast concrete units in place.

Referring to the drawings in detail, Figure 1 shows a foundation wall construction generally designated 1, composed of a concrete poured footing 2, two parallel precast concrete walls 3 and 4 having a pour space 5 therebetween. Each of walls 3 and 4 being comprised of a series of precast concrete units 6 arranged in end to end and bottom to top relationship and held in predetermined relationship by retaining bars 7.

Referring to Figure 2, there is shown a precast concrete unit 6. The precast concrete unit has a top 8,

bottom 9, ends 10 and 11, front face 13 and inner face 12. A narrow incline surface 14 connects inner face 12 to top 8, bottom 9 and ends 10 and 11. Both top 8 and bottom 9 contain holes 15, 16, 17 and 18 which may run continuously from top 8 to bottom 9, or at least deep enough to receive part of retaining bars 7. Horizontal grooves 19, 20, 21 and 22 in top 8 and bottom 9 extend from holes 15, 16, 17 and 18 to face 12.

Referring to Figures 3 and 4 the holes 15, 16, 17 and 18 are seen to run from top 8 to bottom 9 of precast concrete unit 6. However, holes 15, 16, 17 and 18 need not run from top to bottom if a stronger unit 6 is required.

Referring to Figure 5 there is shown a precast corner unit 23. The precast concrete corner unit 23 is a unitary member having a right angular configuration with arms 24 and 25 meeting integrally to form the right angle. The precast concrete unit 23 includes holes 15 and 16 in the top and bottom of arm 24 and holes 17 and 18 in the top and bottom of arm 25. Each of holes 15, 16, 17 and 18 have associated therewith horizontal grooves 19, 20, 21 and 22 in the top 8 and bottom 9 of arms 24 and 25. These horizontal grooves 19, 20, 21 and 22 are adapted to accommodate the horizontal portion of bars 7 when two units 6 and 23 are in position above one another.

Referring to Figure 6 there is shown a precast concrete channel-shaped unit 26. The base of the module 28 and the arms 27 and 29 are integrally formed. Each precast concrete channel-shaped unit includes holes 15, 16, 17 and 18 in the top 8 and bottom 9 and each of the holes 15, 16, 17 and 18 have associated therewith horizontal grooves 19, 20, 21 and 22 in both the top and bottom of the precast concrete channel-shaped unit.

Figure 7 discloses an H-shaped unitary retaining member 30 comprised of a base 31 and vertically extending extensions 32, 33, 34 and 35. The extensions 32, 33, 34 and 35 are generally circular in cross-section and are adapted to fit into the holes 15, 16, 17 and 18 in top 8 and bottom 9 of the precast concrete units.

Referring to Figure 8 there is shown a U-shaped retaining member 36 having a base 37 and right angle vertically extending extensions 38 and 39. The base 37 and right angle extensions 38 and 39 have a generally circular cross-section. The U-shaped retaining member 36 is placed in the concrete footing when the footing is being poured and the extensions 38 and 39 are adapted to be inserted and received in corresponding holes 15 of oppositely disposed precast concrete units of walls 3 and 4.

In the construction of a foundation wall 1 the concrete footing 2 is poured to serve as a base for the foundation wall. Prior to pouring concrete for the foundation wall 1, U-shaped retaining members 36 are suitably arranged in the forms for the footing 2 so that right angle extensions 38 and 39 will project vertically from the footing 2 after the footing 2 has been poured. A series of retaining members 36 are spaced so that the right angle extensions 38 and 39 form two parallel oppositely disposed lines and the spacing between adjacent retaining members 36 corresponds to the distance between adjacent holes 15, 16, 17 or 18 in precast concrete units 6, 23 or 26.

When the pouring of the concrete footing 2 has been completed and the concrete sets, a first row of precast concrete units 6 is placed on the right angle vertically

extending projections 38 of adjacent U-shaped retaining members 36. The precast concrete units 6 which form the opposite wall are placed over the vertically extending right angle extensions 39 of adjacent U-shaped retaining members 36. Both the right angle extensions 38 and 39 are inserted into and received in holes 15, 16, 17 and 18 in the bottom of units 6. After the first row of precast concrete units 6 has been completed then the H-shaped unitary retaining members 30 are inserted into the precast concrete units 6 of walls 3 and 4. The downward extensions 34 and 35 are placed in oppositely disposed holes 15, 16, 17 and 18 in oppositely disposed precast concrete units 6 of walls 3 and 4. The base 31 fits into horizontal grooves 19, 20, 21 or 22 of holes 15, 16, 17 or 18 and is horizontally disposed between walls 3 and 4. After the H-shaped retaining members 30 have been placed in opposite disposed holes of opposing precast concrete units 6 the upward extensions 32 and 33 are in position to receive and retain a second row or course of precast concrete units 6 and to retain these units in vertical and horizontal alignment with the first row of precast concrete units 6. The two parallel walls 3 and 4 are built up row by row in the manner described and as illustrated in Figure 1. The top of the top row is retained by using the U-shaped retaining member 36 in such a manner that the right angle extensions 38 and 39 are inserted downwardly into the holes 15, 16, 17 and 18 in the top of the top row of opposed precast concrete units 6 of walls 3 and 4.

When walls 3 and 4 are complete a support 40 attached to walls 3 and 4 in any known manner is applied against the ends of the walls as a brace to prevent any sideward movement.

of the wall during the concrete pour in the space 5 between walls 3 and 4. The support 40 is removed after the concrete has been poured in space 5 and the concrete has set reasonably firm to provide self-support.

When a corner is desired in the form, a series of precast concrete corner units are joined to precast concrete units at each end of the walls 3 and 4 as the walls 3 and 4 are built up. The precast concrete channel-shaped unit 26 is used in conjunction with an oppositely disposed precast concrete channel-shaped unit 26 held together by H-shaped retaining member 30 as a column form.

When the form 1 made in accordance with this disclosure is high the form 1 may be further anchored by vertical anchoring rods which are fastened at the bottom to the eyes of bolts set in the concrete footing 2 and fastened at the top to the horizontal members 31 of the H-shaped form ties. These vertical anchoring rods are spaced as required to prevent the form from floating.

While four vertical apertures have been shown in precast concrete units 6, the precast concrete units 6, 23 and 26 may be made with two or more spaced vertical apertures without departing from the scope of this invention. The form members may be lined with insulation or sheets of insulation material may be inserted inside the forms if desired.

THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:

1. A filled block and tie wall building system comprising:

a footing;

an inner wall of generally thin cross section rectangular flat-ended, flat-edged vertically disposed precast concrete unit modules abutted flat end to flat end in a course and each course arranged in a plurality of superimposed courses in which lower edges of modules in upper courses abut upper edges of respective lower courses;

an outer wall of generally thin rectangular flat-ended, flat-edged vertically disposed precast concrete unit modules generally corresponding in size and shape to the modules of the inner wall abutted flat end to flat end in a course and each course arranged in a plurality of superimposed courses in which the lower edges of modules in upper courses abut upper edges of respective lower courses;

the inner and outer walls being transversely spaced in a parallel manner, with corresponding courses of each wall being at equivalent heights;

the lower edges of the lowermost courses of the modules being supported upon said footing;

means securing said lowermost courses to the footing to prevent lateral movement of the inner and outer walls with respect to the footing;

means defining at least two longitudinally spaced, upwardly opening apertures in the upper edge of each module;

means defining at least two longitudinally spaced, downwardly opening apertures in the lower edge of each module;

means defining two grooves in at least one of the upper and lower edges of each module, interconnecting the respective two apertures with the inner face of the respective module; and

a plurality of H-shaped ties, each including: two, transversely spaced, vertically upwardly projecting legs; two, transversely spaced, vertically downwardly projecting legs; and a transversely extending cross bar;

the ties being assembled with the modules as follows: each tie having the two downwardly projecting legs thereof received in respective two of the upwardly opening apertures in the upper edges of two transversely spaced ones of said modules at equivalent heights; each respective tie having the two upwardly projecting legs thereof received in a respective two of the downwardly opening apertures in the lower edges of two transversely spaced ones of said modules in the next upper course at equivalent heights; and the transversely extending cross bar being received in a respective two of said grooves in a respective transversely spaced two of said modules; the inner and outer walls being characterized by the absence of mortar between the abutting ends and edges of adjacent modules in the same inner wall and between the abutting ends and edges of adjacent modules in the same outer wall.

2. The system of claim 1 wherein a poured and set filling of concrete or filling material substantially fills the space between the inner and outer walls and unites the modules and ties into an integral wall.

3. The system of claim 1 wherein the modules are internally reinforced with steel.

4. The system of claim 1 wherein the edges of the side modules located away from the opposed side are bevelled.

5. A method of constructing a permanent concrete form of two opposed sides defining a concrete pour space therebetween wherein the two opposed sides are comprised of a plurality of side members arranged in stacked courses in end to end abutting relationship, said side members each having vertically extending apertures located in both the top and bottom edges thereof, adapted to receive the vertically extending legs of H-shaped form ties, and horizontal grooves extending from the mouths of the apertures to the inner face of the top and bottom edges of the side members adapted to receive the horizontal bars of the H-shaped form ties, including the steps of laying a first course of side members in end to end abutting relationship with the apertures in the bottom edges of the side members resting on upwardly protruding anchors in a footing, inserting the lower legs of the H-shaped form ties one in each of the respective apertures in the tops of opposing pairs of side members located in the course opposite one another in the two opposed sides, and placing a further course of side members in end to end abutting relationship on the two opposed sides of the first course of members so that the bottom apertures of the upper pairs of side members are received on the respective upstanding legs of the H-shaped form ties protruding vertically from the tops of the first course of side member pairs below, and continuing similarly with subsequent stacked courses of pairs of side members and H-shaped ties until a desired height for the two opposed sides is reached.

6. A method as claimed in claim 5 wherein each side member has at least two spaced vertical apertures located respectively in its top and bottom surfaces.

7. A method as claimed in claim 5 wherein the anchors in the footing are upright extending prongs corresponding in position with the bottom apertures of the first course of side members.

8. A precast concrete form useful for pouring concrete therein having inner and outer precast concrete walls and a pour space therebetween on a footing having vertical extensions, the inner and outer precast concrete walls being comprised of a plurality of courses of precast concrete units arranged in edge to edge abutting relationship, each said precast concrete unit having at least two spaced vertical apertures in both the top and bottom edges of the precast concrete unit, the apertures being adapted to receive vertical reinforcing elements, a plurality of individual horizontal grooves corresponding in number to the number of apertures and extending inwardly from the mouths of the apertures in at least one of the top or bottom surfaces of the precast concrete units to the inner faces of the precast concrete units, the lowermost row of concrete units being laid in end to end relationship with the apertures in the bottom surface of the concrete units resting on the vertical extensions set in the concrete footing, H-shaped form ties having vertical extensions adapted to engage in said vertical apertures to thereby secure the precast concrete units in rigid vertical relationship, the horizontal bars of said H-shaped ties being received in respective twos of said grooves to thereby secure the inner and outer precast concrete walls relative to one another.

9. A form for pouring concrete wherein inner and outer precast concrete walls define a pour space therebetween on a footing having vertical extensions and are permanent constituents of the structure to be formed, the inner and outer precast concrete walls being formed of concrete units which are arranged in edge to edge and end to end abutting relationship, each precast concrete unit having at least two spaced vertical apertures in both the top and bottom surfaces of the unit and a corresponding plurality of individual horizontal grooves in at least one of the top or bottom surfaces of the precast concrete units, extending inwardly from the exterior of a respective vertical aperture to the inner face of the precast concrete units, the lowermost row of concrete units being laid in end to end relationship with the apertures in the bottom surface of the concrete units resting on the vertical extensions set in the concrete footing, H-shaped form ties the lower legs of which are insertable into the vertical apertures of the precast concrete units with the connecting cross bar of the H-shaped form tie being received in respective twos of said grooves in the top or bottom surfaces of the units to thereby space the opposing precast concrete units apart, the upper legs of said H-shaped form ties being insertable into the vertical apertures in the bottom of the precast concrete units to be added as a course in the next row.

10. A form according to claim 9 wherein the units are of thin cross-section and are reinforced with steel.

11. A method of constructing a concrete form of inner and outer precast concrete walls defining a pour space therebetween on a footing having vertical extensions wherein the

inner and outer precast concrete walls are comprised of a plurality of precast concrete units arranged in edge to edge and end to end abutting relationship, said precast concrete units each having on their top and bottom surfaces at least two spaced vertical apertures for receiving the extensions of an H-shaped form tie and a corresponding plurality of individual grooves running from the exterior portion of the vertical apertures to the back inner face of at least one of the top or bottom surfaces of the precast concrete units the grooves being adapted to receive the horizontal bar of the H-shaped form tie, including the steps of laying the first layer of precast concrete units in end to end relationship with the apertures in the bottom surface of the concrete units resting on the vertical extensions set in the concrete footing, inserting H-shaped form ties so that the horizontal bar is received in said grooves and continuing with subsequent courses of precast concrete units until the inner and outer sides are completed to the desired height, and pouring concrete between the inner and outer walls of precast concrete units to form a wall.

12. A method of constructing a permanent concrete form of two opposed sides, substantially as hereinbefore described with reference to the accompanying drawings.

13. A form for pouring concrete substantially as hereinbefore described with reference to the accompanying drawings.

OR.

DATED THIS 8TH DAY OF AUGUST, 1977.

SPEED-FORM MANUFACTURING LTD.
By Its Patent Attorneys:

CLEMENT HACK & CO.
Fellows Institute of Patent
Attorneys of Australia.

52.771 /13

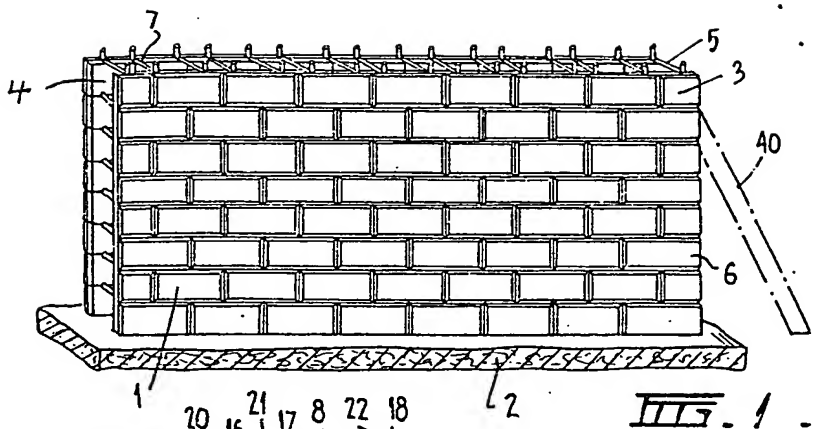

Fig. 1.

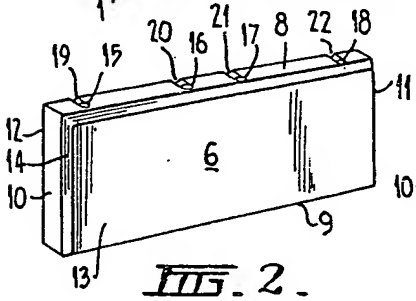

Fig. 2.

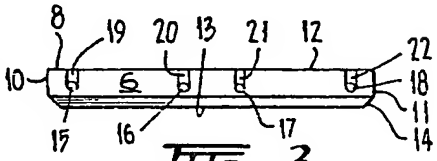

Fig. 3.

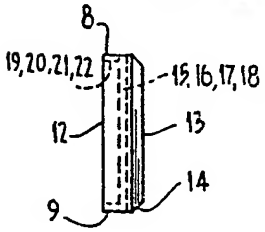

Fig. 4.

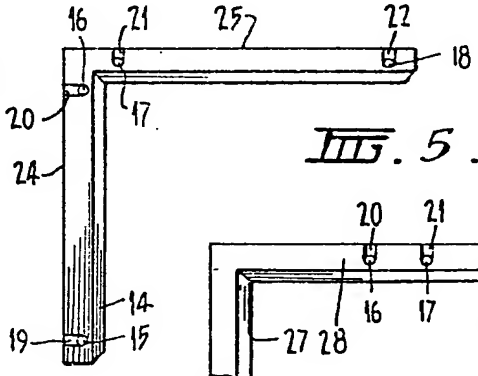

Fig. 5.

Fig. 6.

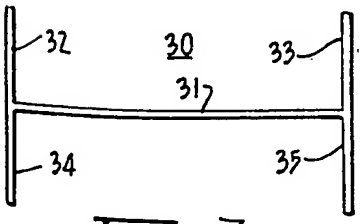

Fig. 7.

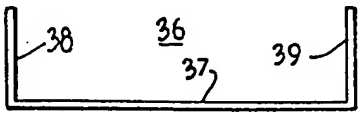

Fig. 8.